Plant Document Analysis

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End of Engineering Analysis Report

ENGINEERING SPECIFICATION ANALYSIS

Focus Area: Weld procedure

Generated on November 18, 2025

Accepted Specifications for Evaluation of Weld procedure

• Industry-standard expectations (references for scope of required welding documentation and controls):

• Welding, heat treatment and non■destructive testing to follow the Project Specification (document explicitly states: "Welding, heat treatment and non■destructive testing shall be in accordance with Project Specification"). (Section 9.5)

• Vendor data list requires submission of a "Weld procedure" and "NDE procedure" as part of vendor deliverables during manufacturing & site erection. (Section 12.2 items ix, xii, xiii)

• Mill test reports / certificates of compliance to be furnished to the Construction Manager (shop inspection requirement). (Section 6.2.1)

• Plates used for flanges with thickness greater than 20 mm shall be ultrasonically tested (explicit requirement for ultrasonic testing of flange plates >20 mm). (Section 5.7.1.11)

• Gasket contact faces of plate flanges shall be machined only after flange to nozzle neck welding has been completed (sequencing requirement affecting weld completion and post■weld machining). (Section 5.7.1.11)

• When shell plates with openings require post weld heat treatment, the openings shall be grouped in as few plates as possible (requirement affecting PWHT planning and weld grouping). (Section 5.7.4.1)

• Austenitic stainless steel tanks: design and requirements are referenced to Appendix S of API 650 (stainless weld/heat treatment considerations to follow Appendix S). (Section 5.6.2.5 and Appendix S reference)

• Carbon and carbon■manganese steel composition limits relevant to weldability and PWHT decisions: Carbon content shall be 0.25% maximum and carbon equivalent (C.E.) shall be 0.43 maximum, with the C.E. formula explicitly given. (Section 4.1.8)

• CE = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15 (formula provided in document)

Measurements Provided in Document

• Explicit numerical thresholds and values that directly affect welding procedures:

• Carbon content limit: 0.25% maximum for carbon / carbon■manganese steels. (Section 4.1.8)

• Carbon equivalent (C.E.) maximum: 0.43 (Section 4.1.8) and the formula:

• CE = C + Mn/6 + (Cr + Mo + V)/5 + (Cu + Ni)/15 (Section 4.1.8)

• Thickness threshold requiring ultrasonic testing of flange plates: greater than 20 mm. (Section 5.7.1.11)

• Thickness threshold indicating materials > 35 mm: ASTM A537 Class 1 or SA516 Gr70 to be used for thicknesses greater than 35 mm (material selection affecting weld procedure/filler choice). (Section 4.2.5)

• Plates whose shell thickness required for pressure plus corrosion allowance exceed 12.5 mm shall be designed per API 620 (impacts choice of standards for welding thicker pressure shells). (Appendix F.7.1)

• Minimum anchor bolt size references (M33) are present but not directly welding■procedure parameters. (Appendix B / F)

Inputs and Additional Requirements from Client

• Items the document explicitly requires the vendor/contractor to provide (relevant to welding):

• Submission of a Weld procedure (WPS) as part of vendor data during manufacturing & site erection. (Section 12.2, item xii)

• Submission of NDE procedure (Section 12.2, item xiii) and provision to carry out NDE in accordance with Project Specification. (Section 9.5)

• Mill test reports / certificates of compliance for materials to be furnished. (Section 6.2.1)

• Design Calculations and Structural & support Calculations (which the contractor must provide and which may include justification of allowable external loads and weld details). (Section 12.2 items vi and vii)

• Nozzle load analysis is required (may affect weld pad sizing and welding details at nozzle junctions). (Section 12.2 item viii)

• CONTRACTOR to specify whether post■weld heat treatment is required and to group openings in as few plates as possible when PWHT is applied. (Section 5.7.4.1)

• Plates used for flanges >20 mm shall be ultrasonically tested and gasket faces shall be machined only after flange-to-nozzle neck welding is completed (vendor must plan NDE and

machining sequence). (Section 5.7.1.11)

• Welding, heat treatment and NDT shall be in accordance with Project Specification — the Project Specification is the governing document for detailed WPS/PQR/WPQ content and acceptance criteria; vendor must follow it. (Section 9.5)

• Explicitly identified missing/required clarifications called out by the document (items vendor must confirm/provide):

• The Project Specification details are required to define the exact welding parameters, acceptance criteria, qualification standards (e.g., specific codes/clauses for WPS/PQR/WPQ), and heat treatment procedures — the document defers to the Project Specification without listing those parameters. (Section 9.5)

• Contractor to specify anchor bolt loadings and details when anchors are required (relevant when welds tie into anchor plates/supports). (Appendix B.7 / B.8)

• Contractor to submit a comprehensive tank test procedure including actions related to post■fabrication/welding testing (hydro/air test procedures referenced but not specified for welding acceptance). (Section 7.3.5.3)

• For austenitic stainless steel tanks, vendor must follow Appendix S — the document does not list the specific welding/heat treatment acceptance criteria for stainless; vendor must supply those per Appendix S and Project Specification. (Section 5.6.2.5 / Appendix S)

Notes on comparison with industry standard expectations (high■level, from common practice)

• Industry standard welding controls expected for a complete weld procedure package (WPS/PQR/WPQ, preheat/interpass/PWHT, filler metal, joint design, NDE and acceptance criteria, welder qualifications per ASME Section IX / AWS / API guidance) are NOT spelled out in the provided document — the document mandates that welding, heat treatment and NDE follow the Project Specification and requires submission of the weld procedure and NDE procedure, but it does not list the detailed WPS parameters or qualification standards itself. (Sections 9.5 and 12.2)

• Produce a checklist of the specific WPS/PQR/WPQ and NDE items you should include in your submitted weld procedure to satisfy typical Project Specification expectations (based on API 650 / ASME IX / common industry practice), or

• Draft a sample outline for a Weld Procedure Specification tailored for tanks (joint design, base/filler metals, preheat/interpass, PWHT triggers, NDE plan) that you can populate with project■specific values from the Project Specification. Which would you prefer?

End of Engineering Analysis Report

End of Engineering Analysis Report